

It is to be hoped that the new code for the regulation of public elementary schools recently issued by the Board of Education, containing as it does a much broader and more scientifically planned curriculum, will remedy this defect, which has for many years hampered technical education in this country. It should be added that the report contains the inaugural address to the students of the Central Technical College, by Sir Guilford Molesworth, and also the address of Sir William White at the distribution of diplomas, &c., to the students of the institute's colleges and schools.

A CONFERENCE of headmasters and headmistresses, of representatives of midland educational authorities, and others interested in secondary education was held on March 19 last under the auspices of the University of Birmingham and the City of Birmingham Education Committee. The speeches delivered on this occasion have now been published in pamphlet form. The conference discussed two subjects at separate sessions. At the first meeting attention was directed to the training of secondary teachers—to what extent it is to be carried out (a) in training colleges, (b) in the schools themselves, and how far such training must depend on Government aid. The subject for the second session was the relative weight to be given to the humanities and to science in the various stages of secondary education. The remarks of some speakers in the discussion on the training of teachers for secondary schools showed that the belief in the necessity for training is not yet universal, though much more common than a few years ago. The headmaster of Shrewsbury, criticising the oft-repeated contention that the chief business of the secondary school is to train character, appropriately said:—"Is the day-school teacher—the secondary school teacher, I mean—to devote himself wholly to the formation of character, while at the same time England is falling into the rear in the matter of commerce and in scientific methods? We may concentrate our efforts on the formation of character until we forget how much more we have to do." The discussion on the relative importance of the humanities and of science was instructive as demonstrating the wide divergence of opinion which exists on most educational problems. Men of science will be disposed to agree with Sir Oliver Lodge, who said:—"I do not much care what is taught so long as it is taught well, and so long as the pupils learn what is taught. . . . I do not believe in having schools where boys having an aptitude for science shall learn nothing else, and schools where boys who have an aptitude for letters shall have nothing but a literary education." A complete education recognises the claims both of scientific and literary studies, and gives to each of these branches of knowledge its proper place.

## SOCIETIES AND ACADEMIES.

### LONDON.

**Royal Society**, April 28.—"On the Changes of Thermoelectric Power Produced by Magnetisation, and their Relation to Magnetic Strains." By Shelford Bidwell, F.R.S.

The experiments described were undertaken with the view of investigating an apparent correspondence to which the author directed attention in an article published October, 1902 ("Ency. Brit.," art. Magnetism), between the effects of magnetisation upon thermoelectric quality and upon dimensions. Reference is made to the work of W. Thomson, Ewing, Chassagny, Houllevigue, and Rhoads. Although some of the results previously recorded appear to be erroneous, it is shown that, at least for iron and nickel, there is an intimate relation between the two phenomena.

In the case of iron, the relation is not disclosed unless allowance is made for the effect of the purely mechanical compression due to magnetisation. The author pointed out in 1888 (*Phil. Trans.*, vol. clxxix. A, p. 216) that a magnetised iron bar must be subject to a compressive stress, the consequent contraction being expressed as a fraction of the original length by the ratio of the lifting power or "tractive force" to Young's modulus. The tractive force was calculated in an earlier paper (*Proc. Roy. Soc.*, vol. xlvii. p. 486).

If a transverse cut is made in a longitudinally magnetised bar, the magnetic force inside the gap is  $B=H+4\pi I$ . One portion of the bar being fixed, the force acting upon the face of the other portion is less than  $B$  by  $2\pi I$ , the part due to the face itself; thus the attractive force per unit area  $=(B-2\pi I)I=2\pi I^2+HI$ . For permanent magnets, when  $H=0$ , and for the special case in which each half of the bar is surrounded by a tightly fitting coil, when the term  $H^2/8\pi$  must be added for the mutual action of the coils, this expression becomes  $B^2/8\pi$ , which is sometimes said to represent "Maxwell's stress." The stress between any two portions of a magnetised bar divided by an imaginary transverse plane is sustained by the intermolecular springs, whatever their physical nature may be, to which the elasticity of the metal is due. Taking Young's modulus in grams per sq. cm. as  $2 \times 10^{10}$ , the extrinsic contraction due to magnetisation, expressed as 10-millionths of length, is  $(2\pi I^2+HI)/200g$ . Curves were plotted showing change of thermoelectric power and change of length in relation to  $H$ , and it was found that, if the latter were "corrected" for mechanical stress and the scale of ordinates suitably chosen, the two curves were almost coincident; without such correction there was no correspondence. The change of thermoelectric power due to magnetisation is therefore proportional to the "corrected" elongation, but the factor of proportionality differs for different specimens and for different physical conditions of the same specimen. It is shown in the paper that the two phenomena are analogously affected by tensile stress and by annealing.

For nickel it appeared, contrary to the accepted view, that the direction of the thermoelectric force was the same as in iron—from unmagnetised to magnetised through hot—whereas the "corrected" change of length is opposite in the two metals, iron being extended, nickel contracted. But the curves for change of length and for change of thermoelectric power were, when one of them was inverted, almost exactly coincident, although no correction was made for the mechanical stress. The question then arises, Why should the correction which is indispensable in the case of iron be unnecessary for nickel? The answer is that while for iron the calculated correction is very considerable (generally, indeed, greater than the observed change of length to which the correction is applied), for nickel it turns out to be exceedingly small; thus it happens that the uncorrected and the corrected curves, if referred respectively to slightly different scales of ordinates so chosen that the two curves may be of the same height, are sensibly identical. The absence of any need for the correction in the case of nickel, where, *a priori*, it ought not to be required, tends to show that the success of its application in the case of iron is not a mere accident, and the compressive stress is consequently a *vera causa*. Some years ago the question of stress in a magnetised metal was discussed by several well known physicists in NATURE (vol. liii. pp. 269, 316, 365, 462, 533), and it seems not to be agreed whether there is in fact any such mechanical stress; whether, supposing one to exist, it is compressive or tensile, and whether it is "Maxwell's stress" or some other. The author submits that the results of the new experiments support his original view.

For cobalt no relation between thermoelectric and dimensional changes attending magnetisation could be found; if any such exists, it is disguised by some cause which has yet to be discovered.

May 19.—"On Saturated Solutions." By the Earl of Berkeley. Communicated by F. H. Neville, F.R.S.

June 9.—"Notes on the Stalolith Theory of Geotropism. I. Experiments on the Effects of Centrifugal Force. II. The Behaviour of Tertiary Roots." By Francis Darwin, F.R.S., and D. F. M. Pertz.

The facts given in the paper prove that when the primary root is removed and a secondary root assumes its place, the tertiary roots take on the character of normal secondaries. It may be believed, therefore, that the existence of staloliths in normal tertiary roots is a provision enabling them to assume diageotropic growth in case of injury to the primary root. This, though appearing a bold conclusion,

does not involve an adaptive action different in principle from the well known assumption by secondary roots of the characters of the primary root, although it is undoubtedly a more elaborate provision, and one which seems more unlikely to be called for in a state of nature.

**Geological Society, May 25.**—Dr. J. E. Marr, F.R.S., president, in the chair.—On the occurrence of a limestone with Upper Gault fossils at Barnwell, near Cambridge: W. G. **Fearnside**. The limestone is variable in thickness, and is largely made up of comminuted shells of *Inoceramus*. It occurs in flattened lentilles. It contains abundant phosphate-nodules. Foraminifera, fragments of lamellibranchs, brachiopods, small gastropods, echinoids, and Crustacea are abundant. The fauna is not markedly different from that of the underlying clay. A list is given which shows that this fauna has been recorded from the Upper Gault of Folkestone. As these fossils are obtained 40 feet below the upper surface of the Gault seen in the section, it is clear that the whole of the Upper Gault of Cambridge was not used up in the making of the "Cambridge Greensand."—On the age of the Llyn-Padarn dykes: J. V. **Elsden**. The paper suggests that the bulk of the greenstone-dykes of this area belong to an earlier period of eruption than has been generally assigned to them. The greater part, if not actually of Bala age, seem to have been intruded before the post-Bala crush-movements. The evidence does not exclude the possibility that some of the intrusions may be of later date. Petrographical considerations make it impossible to separate these rocks from the diabase-sills of Bala age occurring farther to the south of this area.

**Chemical Society, June 2.**—Dr. W. H. Perkin, F.R.S., vice-president, in the chair.—The following papers were read:—Imino-ethers and allied compounds corresponding with the substituted oxamic esters: G. D. **Lander**. A description of the ethers obtained by the condensation of various bases with oxalic esters is given.—The action of heat on  $\alpha$ -hydroxycarboxylic acids, part i.,  $\alpha$ -hydroxystearic acid: H. R. **Le Sueur**. The principal product obtained on heating this acid is margaric aldehyde.—Ionisation and chemical combination: J. Wallace **Walker**. The author shows that the assumption now generally made that all chemical action takes place between pre-existing ions is unjustifiable, in view of the fact that reactions such as those of the alkyl haloids with various compounds in presence of aluminium chloride take place under conditions under which ionisation cannot occur. Since ionisation is frequently the result of such reactions, he concludes that, in general, combination, as the result of the operation of higher valencies, precedes ionisation or any other manifestation of the occurrence of chemical change.—Ionisation and chemical combination in liquefied halogen hydrides and hydrogen sulphide: J. W. **Walker**, D. **McIntosh**, and E. H. **Archibald**.—Some compounds of aluminium chloride with organic substances containing oxygen: J. W. **Walker** and A. **Spencer**. These two papers give descriptions of compounds and experiments illustrating the arguments advanced in the first paper of this series.—The constituents of *Chaulmoogra* seeds: F. B. **Power** and F. H. **Gornall**. These seeds, which are derived from the plant *Taraktogenos Kurzii*, contain a cyanogen compound which is hydrolysed by an enzyme also present in the plant or by dilute acids into prussic acid and glucose, and may be a glucose-cyanhydrin. The fatty oil contained in the seeds furnishes on hydrolysis glycerol and phytosterol, and a number of fatty acids of which the most interesting is chaulmoogric acid  $C_{18}H_{32}O_2$ , which appears to contain a closed ring and one ethylenic linking.—The constitution of chaulmoogric acid, part i., F. B. **Power** and F. H. **Gornall**. A number of derivatives and oxidation products of this acid are described which have been prepared as a preliminary to the investigation of its constitution.—Gynocardin, a new cyanogenetic glucoside: F. B. **Power** and F. H. **Gornall**. This substance was obtained from the seeds of *Gynocardia odorata*, formerly believed to be the source of commercial chaulmoogra oil. It is crystalline, and is hydrolysed by an enzyme also existing in the plant furnishing prussic acid

as one product.—*iso*Nitrosocamphor: M. O. **Forster**. A description of derivatives of this substance.—The basic properties of oxygen. Additive compounds of the halogen hydrides and organic compounds, and the higher valencies of oxygen. Asymmetric oxygen: E. H. **Archibald** and D. **McIntosh**.—The fermentation of the indigo plant: C. **Bergthell**. It is shown that the fermentation in the indigo vat is produced principally by a specific enzyme.—The union of hydrogen and chlorine. Action of the silent electric discharge on chlorine: J. W. **Mellor**.—Studies on ethyl-carboxylglutarate, part ii., action of ethyl bromocarboxylglutarate on ethyl sodiocarboxylglutarate. Formation of ethyl carboxylglutamate: O. **Silberrad** and T. H. **Easterfield**.—The vapour pressures of liquid mixtures of restricted mutual solubility: A. **Marshall**. The vapour pressures of mixtures of water with various organic liquids have been experimentally investigated, and the results are discussed in the light of theoretical work on the same subject by Ostwald and others.—The influence of solvents on the rotation of optically active compounds, part v., the optical activity of certain tartrates in aqueous solution: T. S. **Patterson**. The rotations of a number of tartrates have been determined in aqueous solution at various concentrations and temperatures, and the influence of the latter on the numerical and sign value of the rotation is discussed.—The nitration products of the isomeric dichlorobenzenes: P. **Hartley** and J. B. **Cohen**. The authors find that the *meta*-law of substitution is followed, except in the case of *orthodichlorobenzene*.

**Linnean Society, June 2.**—Prof. W. A. Herdman, F.R.S., president, in the chair.—Mr. A. O. **Walker** exhibited (1) viviparous plants of *Cardamine pratensis*, which phenomenon was unusually manifest this year, probably due to the abnormal rainfall, and (2) a gall on the flower-bud of the same plant, ascribed to *Cecidomyia Cardaminis*.—Mr. W. T. **Hindmarsh** exhibited photographs of the following plants:—*Primula deorum*, Velen., which he had succeeded in flowering, he believed for the first time in this country; *Shortia uniflora*, Maxim., the Japanese representative of the genus, with larger flowers than the original *S. galacifolia*, Torr. and Gray, and showing a tendency to vary in colour according to exposure; and *Rhodothamnus Chamaecistus*, Reichb., noteworthy for the abundance of its flowers.—*Papers*:—On the species of *Impatiens* in the Wallichian herbarium of the Linnean Society: Sir Joseph **Hooker**. The introduction described the material in question, consisting of 48 ticketed specimens out of 200 known species of the genus; though few in number, these specimens foreshadow the remarkable segregation of the species in the several phytogeographical regions of India, which has no parallel in any other large genus known to the author. The second part of the paper consists of a detailed review of each sheet of the collection, with a critical determination of the specimens. There is one previously undescribed species, for which the name *Impatiens praetermissa* is proposed.—An account of the *Chaetognatha* collected on H.M.S. *Research* in the Bay of Biscay in 1900: Dr. G. H. **Fowler**. *Sagitta serrato-dentata* was plentiful in the ep plankton down to the zone between 200 and 100 fathoms, with a maximum distribution about 50 fathoms; in daylight it appeared to rise to the surface, independently of the actual light-intensity of the moment; at night it left the surface for rather deeper water; even on bright moonlit nights, or during or after rain, it also deserted the surface, even in light daylight. The distribution of other species was described. In handling the *Chaetognath* population as a whole, the author showed that it was thickest in the ep plankton, that below 100 fathoms there was a sudden drop in numbers, which continued down to the lowest depth studied (2000 fathoms), except for a possible slight local rise about 600 fathoms. This result, obtained by the accurate method of closing nets, directly contradicts the conclusion of Mr. R. T. Günther, deduced from the methods of open serial nets as used on the *Oceana*, that the population is greatest in deep water, the source of error with the open nets being introduced by the specimens captured during the net's upward journey to the surface from the depth nominally studied.—The flow of fluid in plant-stems: Prof. R. J. **Anderson**.



The experiments of the author were devoted to forcing water through woody stems, but references to the work of earlier investigators are not given.

**Mathematical Society, June 9.**—Prof. H. Lamb, president, in the chair.—The following papers were communicated:—Note on the application of Poisson's formula to discontinuous disturbances: Lord **Rayleigh**. Poisson's solution of the equation

$$\frac{\partial^2 \phi}{\partial r^2} = a^2 \nabla^2 \phi$$

has the form

$$\phi = \frac{t}{4\pi} \int \dot{\phi}_0 d\sigma + \frac{\partial}{\partial t} \left( \frac{t}{4\pi} \int \phi_0 d\sigma \right),$$

where  $\phi_0$  and  $\dot{\phi}_0$  denote initial values of  $\phi$  and  $\partial\phi/\partial t$  on a sphere of radius  $at$ , and the integration refers to angular space about the centre of the sphere. When the initial disturbance is continuous at the surface bounding the initially disturbed portion of the medium, the solution may be written in the form

$$\phi = \frac{1}{4\pi} \int \left( t\phi_0 + \phi_0 + r \frac{\partial \phi_0}{\partial r} \right)_{r=at} a\sigma.$$

It is pointed out in the paper that, when there is discontinuity, the subject of integration in the latter form becomes infinite, and it is shown by an example how the integral may be interpreted so as to yield the correct result.—Wave fronts considered as the characteristics of partial differential equations: T. H. **Havelock**. It is shown that a wave front can be defined as a surface satisfying the principal equation of the characteristics of the equation of wave motion, and that, owing to the linearity of the latter equation, there is no necessity for the continuity of the first differential coefficients of the function expressing the disturbance, provided the function itself is continuous. The theory is extended to systems of partial differential equations, and, in particular, to the equations of propagation of electric waves. An invariantive property of characteristics is proved, and is applied to the theory of wave fronts and rays in moving media.—Illustrations of perpetuants: J. H. **Grace**. The quantic of infinite order being equivalent to a power series, the perpetuants are expressed as the results of performing certain operations of differentiation upon analytic functions represented by such series. It is shown that certain ones of the known analytic functions, such as the exponential function and the Weierstrassian sigma function, are determined by the vanishing of the simpler perpetuants.—Types of covariants of any degree in the coefficients of each of any number of binary quantics: P. W. **Wood**. A method is given for determining the type forms of the complete system mod  $(ab)^m$ . The method consists in carrying out systematically a process indicated by Jordan, and previously applied to perpetuants by Grace.—Some expansions for the periods of the Jacobian elliptic functions: H. **Bateman**.

DUBLIN.

**Royal Dublin Society, May 17.**—Prof. J. A. McClelland in the chair.—Mr. J. H. **Pollok** read a paper on the extraction of glucina from beryl by fusion with caustic soda, solution in hydrochloric acid and saturation with hydrogen chloride to precipitate the alumina, the glucina and iron being afterwards separated by ammonium carbonate and sulphide. Analyses of carbonates, sulphates, and chlorides were also given that differed somewhat from theory.—Mr. F. E. **Hackett** read a paper on the  $n$ -rays. Some estimations of the magnitude of the subjective effects in the dark-adapted eye are given in this paper. It was found that bodies under strain produced an effect on a phosphorescent screen which could not be assigned to eye effects or the emission of heat.

PARIS.

**Academy of Sciences, June 6.**—M. Mascart in the chair.—On the parallax of the sun: Bouquet **de la Grye**. An account of the mode of working up the data from the photographic plates obtained in the French expedition for the observation of the transit of Venus in 1882.—On the

photography of the superposed layers which constitute the solar atmosphere: H. **Deslandres**. A discussion of the work done with the large refractor at the Yerkes Observatory in relation to earlier results, together with some suggestions as to future work.—The accidental production of an intralibarian generating layer in the roots of Monocotyledons: Gaston **Bonnier**. A wound may provoke in the roots of certain Monocotyledons the commencement of secondary formations organised in the same manner as in a root of a Dicotyledon.—The physiological action of the emanation of radium: Ch. **Bouchard**, P. **Curie**, and V. **Balthazard**. The introduction of the radium emanations into the lungs of animals gives rise to toxic effects, the dominant lesion observed on *post mortem* examination being an intense pulmonary congestion. The tissues of the animals which have died under the action of the radiations are radio-active.—The radium emanation, *exradio*, its properties and changes: Sir William **Ramsay**. The emanation which escapes from radium bromide possesses the properties of a gas; it obeys Boyle's law, can be condensed at low temperature, and possesses an appreciable vapour pressure at the temperature of liquid air. The quantities available were extremely minute, about 0.0254 cubic millimetre, but this was found sufficient to prove the relation between volume and pressure, and also to obtain the spectrum. The gas is strongly luminous, but this grows weaker with time, and at the end of a month disappears. The gas appears to belong to the argon group, and has a density of about 80. If the molecule is monoatomic, the atomic weight would be 160, from which it would follow that one atom of the emanation is produced from one atom of radium.—The action exercised by the  $n$ -rays upon the intensity of the light emitted by a small electric spark, and upon some other feeble sources of light: R. **Blondlot**. A discussion of the views of M. Jean Becquerel as to the action of the  $n$ -rays upon the luminosity of a calcium sulphide screen, and an extension to the cases of a small electric spark and of a piece of platinum foil at a dull red heat.—On the emission of the  $n$ -rays and the  $n_1$ -rays: E. **Bichat**.—On the emission of the  $n$ -rays and  $n_1$ -rays by crystallised bodies: E. **Bichat**.—On the fifth scientific campaign of the *Princesse Alice*: Prince Albert of **Monaco**.—On expressions formed of superposed radicals: Paul **Wiernsberger**.—On the movements of solids with spherical trajectories: Jules **Andrade**.—On a variant of the universal joint: L. **Lecornu**.—On the critical velocity of directable balloons: Ch. **Renard**. It is shown that a balloon of the Santos-Dumont type must become ungovernable when the velocity approaches a certain critical value.—On the cathode rays: P. **Villard**. It is shown that the properties of the magneto-cathodic rays are inverse to those of the Hittorf rays; an electric field acts on the first like a magnetic field does on the second.—On a method of measuring coefficients of self-induction: M. **Iliovici**.—On the phenomena which accompany the contemplation in a dark room of feebly luminous surfaces illuminated by special kinds of light. The case of spots of phosphorescent sulphide; the effects of anæsthetics: F. P. **Le Roux**.—On the anæsthesia of metals: Jean **Becquerel**. Aluminium and copper lose their transparency to the  $n$ -rays when the surface which receives the radiation is submitted to the action of an anæsthetic; quartz appears to possess the same property. Glass, wood, and cardboard, on the other hand, always allow the radiation to pass through.—A method for the continuous registration of the state of ionisation of a gas: Ch. **Nordmann**.—The influence of the frequency in electrolysis by alternating currents: André **Brochet** and Joseph **Petit**. The electrolytic properties of alternating currents appear to be altogether different from those of continuous currents. The results obtained depend on the frequency of the alternations.—On the use of the  $n$ -rays in chemistry: Albert **Colson**.—On the reduction of *o*-nitrobenzyl alcohol. General remarks on the formation of indazyl derivatives: P. **Freundler**. The principal reduction products of *o*-nitrobenzyl alcohol are indazyl-*o*-benzyl alcohol, indazyl-*o*-benzoic acid, and anthranilic acid.—A new method for the preparation of anilides: F. **Bodroux**. The alkyl-magnesium compound is treated with an amine, and to the product an alkyl ester is added. From this, hydrochloric acid gives the anilide in a nearly theoretical yield. Details

are given of the cases in which the method has been successfully applied.—On humic manures: J. **Dumont**.—Study of the reaction brought about by an indirect oxidising ferment (anæroxydase): E. **Bourquelot** and L. **Marchadier**.—The destruction of the chrysalis of the silk cocoon by artificial cold: J. **de Loverdo**. The destruction of the chrysalis can be effected with greater certainty by cooling than by the usual method of heating.—On the apparatus for the collection of plankton: T. **Richard**.—On the Acarophytes: M. **de Wildeman**.—On barium sulphate from Lozère: M. **Guédras**.—On the platform of the higher summits of the Transylvanian Alps: E. **de Martonne**.—On seismic phenomena in northern Africa: F. de Montessus **de Ballore**.—On a volcanic eruption which took place in Arabia near the town of Medina on June 30, 1256: M. **Houdas**.—On the fossil flora of the Antarctic regions: A. G. **Nathorst**.—On the ergastoplasmic formations of the nephridial cells of sangsue (*Hirudo medicinalis*): Louis **Fage**.—Relation between the intensity of the reflexes and the nervous organisation: Ed. **Toulouse** and Cl. **Vurpas**.—Respiration in an atmosphere the oxygen of which is considerably rarefied is not accompanied by any modification of intraorganic combustions, as measured by the respiratory exchanges: T. **Tissot**.—The injection of phloridzine in the milch-cow: Ch. **Porcher**. The effect of the injection is to increase the amount of lactose in the milk.—Researches on the causes of natural immunity of snakes: C. **Phisalix**. The natural immunity of snakes is to be attributed to the presence of a free antitoxin in the blood which neutralises the poison as it penetrates into the circulation.—The agglutination of the red blood corpuscles by colloidal ferric hydrate, sodium chloride, and by different serums: Madame **Girard-Mangin** and Victor **Henri**.

## GÖTTINGEN.

Royal Society of Sciences.—The *Nachrichten* (physico-mathematical section), parts i. and ii. for 1904, contains the following memoirs communicated to the Society:—

January 9.—P. **Drude**: The theory of light in "active" bodies.

January 23.—O. **Wallach**: Researches from the university chemical laboratory, xiii. (1) A new instance of optical isomerism. (2) The splitting of camphorophorone. (3) On 1:2 methylcyclopentanone. (4) On isoximes. W. **Biltz**: The relation of certain inorganic colloids to fibre with reference to the theory of dyeing.

February 20.—F. **Krüger**: The theory of electro-capillarity and of drop-electrodes.

March 5.—D. **Hilbert**: Principles of a general theory of linear integral equations (part i.). O. **Blumenthal**: Remark on the theory of automorphous functions. A. **Sommerfeld**: Contributions to the theory of electrons. (1) General investigation of the field of an electron moving in any manner. V. **Hensen**: The graphical process for deriving correct curves from the results of observations. W. **Biltz**: An attempt towards the interpretation of agglutination.

March 19.—W. **Nernst** and F. **von Lerch**: On the employment of the electrolytic detector in Wheatstone's bridge.

## DIARY OF SOCIETIES.

## THURSDAY, JUNE 16.

ROYAL SOCIETY, at 4.30.—The Origin and Growth of Ripple-Mark: Mrs. H. Ayrton.—On the Seismic Effect of Tidal Stresses: R. D. Oldham.—On Flame Spectra: C. de Wavetille.—An Experiment Illustrating Harmonic Undertones: H. Knapman.—A Probable Cause of the Yearly Variation of Magnetic Storms and Auroræ: Sir Norman Lockyer, K.C.B., F.R.S., and Dr. W. J. S. Lockyer.—On the Relation between the Spectra of Sun-spots and Stars: Sir Norman Lockyer, K.C.B., F.R.S.—On the Action of Wood on a Photographic Plate in the Dark: Dr. W. J. Russell, F.R.S.—The Retardation of Combustion by Oxygen: Prof. H. E. Armstrong, F.R.S.—(1) The Specific Heat of Diamond, Graphite and Ice between the Ordinary Temperature and the Boiling Point of Hydrogen. (2) The Absorption and Thermal Evolution of Gases Occluded in Charcoal at Low Temperatures. (3) Direct Separation of the most Volatile Gases from Air without Liquefaction: Prof. J. Dewar, F.R.S.—On the Influence of the Time Factor on the Correlation between Barometric Heights at Two Stations 1000 Miles Apart: Miss

F. E. Cave-Browne-Cave.—The Decomposition of Ammonia by Heat: Dr. E. P. Perman and G. A. S. Atkinson.—On the Action of Radium Emanations on Diamond: Sir William Crookes, F.R.S.—*And other papers.*

LINNEAN SOCIETY, at 8.—Variations in the Arrangement of Hair in the Horse: Dr. Walter Kidd.—An Account of the Jamaican Species of Lpanthes: W. Fawcett and Dr. A. B. Rendle.—On the Blaze-currents of Vegetable Tissues: Dr. A. D. Waller, F.R.S.—British Freshwater Rhizopoda: James Cash.—Notes on the "Sudd" Formation of the Upper Nile: A. F. Brown.—The Place of Linnæus in the History of Botany: P. Olsson-Seffon.

INSTITUTION OF MINING AND METALLURGY, at 8.—The Causes and Prevention of Miners' Phthisis: Dr. J. S. Haldane, F.R.S., and R. Arthur Thomas.—Note on an Exhibit of an Emergency Set for First-Aid Treatment of Acute Cyanide Poisoning: H. C. Jenkins.—On the Assay of Tin, and on the Solubility of Cassiterite: J. H. Collins.—Iron Ore Mining in Scandinavia: W. Fischer Wilkinson.—Note on the Crib-Setting of a Deep Level Shaft: H. D. Griffiths.

## MONDAY, JUNE 20.

SOCIOLOGICAL SOCIETY, at 5.—On the Relation of Sociology to the Social Sciences and to Philosophy: Prof. E. Durkheim and V. Branford.

## TUESDAY, JUNE 21.

ROYAL STATISTICAL SOCIETY, at 5.

## WEDNESDAY, JUNE 22.

GEOLOGICAL SOCIETY, at 8.—The Caernarvon Earthquake of June 19, 1903, and its Accessory Shocks: Dr. C. Davison.—The Igneous Rocks of Pontesford Hill, Shropshire: W. S. Boulton.—The Tertiary Fossils of Somaliland, as Represented in the British Museum (Natural History): R. B. Newton.

## FRIDAY, JUNE 24.

PHYSICAL SOCIETY, at 5.

## CONTENTS.

## PAGE

Oxford on the Up Grade. By H. E. A. . . . .	145
A New Type of Botanical Text-book. By V. H. B. . . . .	148
A System of Geographical Classification. By E. H. . . . .	149
Our Book Shelf:—	
Graham: "The Sporting Dog."—R. L. . . . .	149
Bourdeau: "Histoire de l'Habillement et de Parure" . . . . .	150
Rhind: "The Ether: Some Notes on its Place in Nature" . . . . .	150
Boone: "A Safe Course in Experimental Chemistry."—J. B. C. . . . .	150
Beare: "Catalogue of British Coleoptera" . . . . .	150
Ashford: "A Preliminary Course of Practical Physics" . . . . .	151
Letters to the Editor:—	
On the Radio-activity of Natural Gas.—Prof. J. C. McLennan . . . . .	151
The Source of Radio-active Energy.—Dr. C. V. Burton . . . . .	151
New Land. ( <i>Illustrated.</i> ) . . . . .	152
An Important Archæological Discovery in Egypt. ( <i>Illustrated.</i> ) . . . . .	155
Notes. ( <i>Illustrated.</i> ) . . . . .	157
Our Astronomical Column:—	
Comet 1904 a . . . . .	160
Duration of the Perseid Shower . . . . .	160
Foundation of a New Astrophysical Observatory . . . . .	160
The Total Solar Eclipse of 1905 . . . . .	160
Actual Distances between Stars . . . . .	161
The Succession of Changes in Radio-active Bodies. By Prof. E. Rutherford, F.R.S. . . . .	161
Recent Publications in Agricultural Science . . . . .	162
Maidstone Meeting of the South-eastern Union of Scientific Societies . . . . .	162
Educational Conference at the Horticultural Exhibition. By Wilfred Mark Webb . . . . .	163
University and Educational Intelligence . . . . .	164
Societies and Academies . . . . .	165
Diary of Societies . . . . .	168